mini dvr pro™

Compact Flash Model
Digital Video Recorder

User's Manual

Revision 1.4
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http://www.ffv.com

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Overview

The **Mini DVR Pro** is a standalone, handheld, pocket-sized digital video recorder with exceptional image quality, featuring scalable motion-JPEG compression and an outstanding 720 x 486 pixel image resolution. The dvr records up to 2 hours at a 20:1 compression with readily available compact flash cards. It only uses multi-word DMA mode 2 compact flash cards. The recorder is equipped for downloadable files via an on-board USB 2.0 port and is powered by either Alkaline or NiMH AA size batteries. Extended operation during in-office playback or editing is assured using the supplied 9V power supply. DVR is designed to develop and evolve as the industry changes. New features are implemented regularly, most of which can be easily implemented by the DVR's firmware, downloadable via FFV's Web site, http://www.ffv.com (see page 8 for instructions).

The M-JPEG compression settings on all versions of the Mini DVR Pro are user selectable from 4:1 to 20:1. In practice, it is advisable to set the compression to correspond with the best quality to storage ratio. A setting of 7:1 is a good setting for general purpose Betacam images, 10:1 for S-VHS, 15:1 for VHS. The rule of thumb for minutes of storage generally available is compression ratio time gigabytes available, example : 10:1 compression ratio x 4 gigabytes = 10 x 1 + 40 Minutes recording time.

With single frame recording enabled, a frame will be recorded every time the record button is pressed. The Loop record function continuously records material over the available space on the drive at the time the recording starts. The loop never overwrites video on the drive prior to the start of a record. Two drives function the same as one, the first drive is filled, then the second, then material is overwritten in the order recorded until the record is stopped.

Standard Features

- Scalable Motion JPEG compression
- Analog Composite & Y/C Inputs & Outputs
- Time/Date Stamp & Character Overlay
- PC Viewable Files or Secure Video Files
- Powered by 4 AA Batteries
- External DC power module (International)
- NTSC, NTSC Japan (0 IRE black), or PAL
- 2 Line Audio inputs (or optional 1 mic input)
- Stereo Audio Headphone Jack
- Time-Lapse Recording
- Loop Record
- RS-232 Control Set Up
- Slow Motion Playback via External Control
- 2 LED Outputs
- Bezel Controls with external trigger connector
- 2 Line Audio Channels out
- USB 2.0 Download Port

Front Bezel Buttons and Functions

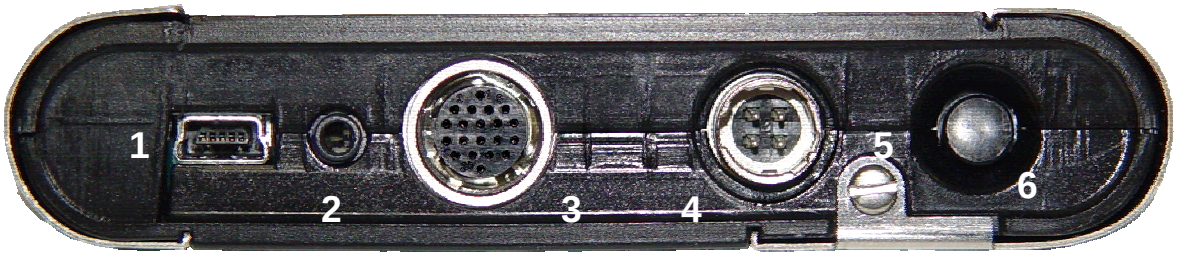
PASS-THRU: The red LED to the left of the record button will flash once per second indicating that it is in digital pass-thru mode, which indicates it is record ready.

Pushbutton Operation

Function	Req. State	Keys	Notes
Start Record	Any but Record	●	
Stop Record	Record	▶ + ●	Hold Play/Stop and tap Record
Change to Pass-Thru	Play or Stop	◄ + ►	Simultaneous
Play forward – 1x	Stop	▶	
Pause	Play	▶	
Step Fwd 1 frame	Play or Stop	►	
Step Rev 1 frame	Play or Stop	◄	
Seek start next clip	Play or Stop	⏭	
Seek to end	Play or Stop	⏭	Hold for ½ second
Seek start previous clip	Play or Stop	⏮	
Seek to beginning	Play or Stop	⏮	Hold for ½ second
Scan Fwd – 5x	Play ≠ 5x	► + ⏭	Simultaneous
Scan Fwd – 30x	Play = 5x	► + ⏭	Simultaneous
Scan Rev – 5x	Play ≠ -5x	◄ + ⏮	Simultaneous
Scan Rev – 30x	Play = -5x	◄ + ⏮	Simultaneous
Clear Disk	Any but Record	⏮ + ⏭ + ●	**Keys pushed and held in order** (with 1 second between each button press), **released** (LED flashes Red and Green quickly), **and repeated once**. LED should Stop while clearing disk, then flash Red.

Function changed in July 11, 2005 firmware. Click Rev. button in DVR Master software to see firmware revision date.			
Clear Disk	Any but Record	⏮ + ⏭ + ●	Push and hold ⏮, then ⏭, then press ● and release all three (LED flashes red and green quickly), then press and hold ● for 5 seconds. LED will flash fast red, until last two seconds of format - it changes to fast green blink. Returns to slow red blink when ready to record.

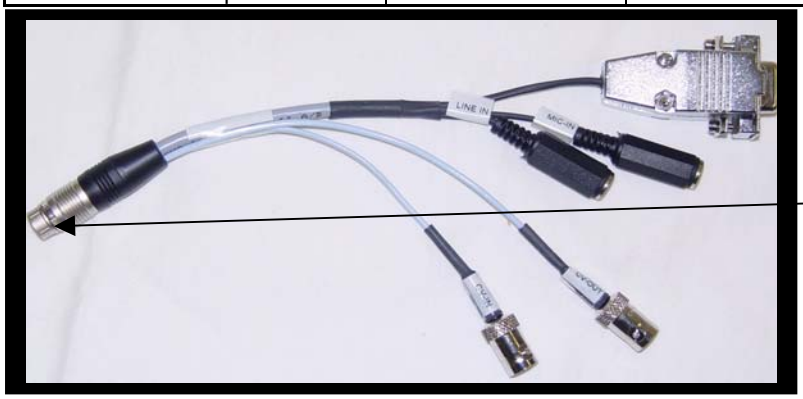
Rear Panel Illustration



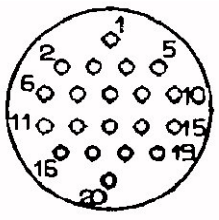
1. USB Port
2. Audio Jack - Stereo Line out
3. I/O Connector:
   - Composite Video – In / Out
   - Y/C Video – In / Out
   - External Triggers - 1 & 2 In
   - Reference Video – In
   - 2 Lines Audio – In
   - 1 Line Mic – In
   - RS232 In / Out
4. Power Connector
5. Battery Door Locking Screw
6. Power Button - Button must be held 3 seconds to turn DVR “ON” or “OFF”.

Standard Cable configuration

	Standard Cable	**P/N 302-SA103-1**		
HR Pin #	**Signal Name**	**Cable Type**	**Connector #**	**Connector Pin**
1	Composite Video In		Comprehensive	Center
5	Video Shield	75 Ohm Coax	BJ-RGB	Shield
6	Tx			2
7	Ground	3 wire twisted	DB-9F w/ Hood	5
8	Rx			3
11	Mic In			Signal
12	Ground	2 wire twisted	Kubiconn 16PJ227	Ground
13	Line In			Signal
14	Ground	2 wire twisted	Kubiconn 16PJ227	Ground
19	CV Shield		Comprehensive	Shield
20	CV-Composite Out	75 Ohm Coax	BJ-RBG	Center



DVR end = Hirose HR 25-9P-20PC



Wiring side of the pin insert.

Connector Pinouts

Video, RS-232 I/O; Trigger, Audio In

The mating connector: **HR25-9P-20PC**.

1	CV or Y In
2	Trig 1
3	GND
4	C In
5	GND
6	RS-232 - Txd
7	RS-232 - Gnd
8	RS-232 - Rxd
9	Trig2
10	Ref In
11	Microphone In
12	GND
13	L Line In - Audio
14	GND
15	R Line In - Audio
16	Y Out
17	GND
18	C Out
19	GND
20	Composite Out

Headphone / Line Audio Output mini-jack…

Standard 2.5mm Stereo connections

Tip	Left Output
Ring	Right Output
Shank	Ground

Power Connector

The mating connector: **HR10A-7P-4S**.

1	+7 to +25 Vdc - We use +9V.
2	+7 to +25 Vdc - We use +9V.
3	Ground
4	Ground

USB Pinout is Standard mini-USB.

Compact Flash Installation Procedure

To install the Compact Flash Cards, follow the procedure below:

Be sure to have Power OFF prior to installing or removing Compact Flash parts. Grasp DVR in left hand with the long metal door on the right side, grip the compact flash door with right hand and slide it toward you to expose compact flash connector number one, slide door away from you to expose connector number two. Insert the compact flash card and slide the door to the center (closed) position.

To remove cards, repeat the process above and depress the ejector button located at the extreme front and rear of the compact flash door access areas.

The Mini DVR Pro uses multi-word DMA mode 2 compact flash only.

LED Operation

The action described below occurs immediately when the button is pressed.

LED Operation

MODE	ACTION	LED	DISPLAY
Pass-Thru	Pause	1	High - 0.1 Sec. per Sec. - Single short blink per second.
Pass-Thru	Record	1	High Output - LED On.
Playback	Stop	2	High - 0.1 Sec. per Sec. - Single short blink per second.
Playback	Play (1:1)	2	High Output - LED On.
Playback	Forward - non 1:1	2	LED high in a pattern short, short, long, short
Playback	Reverse - non 1:1	2	LED high in a pattern short, long, short
Confirm Video Delete		1 & 2	Alternate short blinks.
Pass-Thru	At Record Start	3	High for 3 seconds.
Pass-Thru	At Record Stop	3	High for (3) 0.3 second pulses separated by 1 second

USB Operation

The USB connection is used to view recorded video using the QuickTime player on a computer. The files must be recorded using the FAT32 Disk format and the QT file format. The drivers are included in Windows 2000 and Windows XP for the connection. The drive should show up as an external drive when the USB cable is connected and the DVR is powered On, unless the unit is in Record. The DVR will not allow USB access when recording since all data on the drive could be damaged / deleted by doing so. Connecting the USB cable during Play will Stop the DVR because the DVR and the USB cannot access the drive simultaneously.

The files containing video will have long filenames the same as the clip title and this numerical information to separate multiple files of the same clip AAAABB, where the 'AAAA' and 'BB' are hexadecimal numbers; the digits 'BB' increment from lower to higher for as many files as are in one clip. All other files on the drive are not video files, and therefore, are not playable. The FAT32 format limits file size to 2 GB. Long video clips will span file boundaries.

Video requires a fast computer to play smoothly in real time. If your video does not play smoothly, QuickTime Pro has a setting under the Movie tab to Play all frames. This slows the video to the speed of the computer, but shows all of the frames recorded.

Audio in QuickTime files is Single Channel from the Left Input.

Trigger Operation

External trigger connections (part of I/O connector) allow the user to start and stop the DVR by taking the following action:

Input #	Pin #	Action Required	DVR Response
1	2	Close Momentary Ground	Start Record
2	9	Close Momentary Ground	Stop Record

Native Mode vs BVW-75 Mode

NATIVE MODE

Native mode is the most natural state for the DVR to operate in as it utilizes the random access capabilities of the hardware most effectively. As you record material to the DVR, it stores the material in available space on the storage media. When the media is full, the DVR stops recording and will not start recording until video has been deleted.

RECORDING IN NATIVE MODE: Recording in native mode will place the recorded material in the next available free space on the disk. Native mode will not allow you to record over previously recorded or existing material. An error message will appear indicating that the disk is full when all available space has been used at which time you will need to clear the disk to record.

BVW-75 MODE

Linear mode is a simulation of an existing VTR. The DVR in linear mode, is forced to adhere to strict record guidelines as if it actually were a tape deck. If you would like to operate the DVR as a VTR, make sure you have selected BVW-75 mode from the SETTINGS tab section. You can then record over existing material as you would with a VTR.

The main feature of this mode is the ability to insert edit material over previously recorded material. The mini DVR pro, in BVW-75 mode assumes that it has a 24 hour tape of "black" attached to itself which has time code assigned from 00:00:00:00. If you were to tell the DVR to record a 10 second clip at 00:01:00:00 for 10 seconds, it would record this and the machine would then assume it had 1 minute of black, 10 seconds of video from the 1 minute time code mark, and then 23:58:50:00 of black after this. If you want to record over this clip and add new information, it will insert the video at the same points and overwrite the data on the drive in the same way, always maintaining the 24 hours of time code as the master reference. NOTE: Playlist functionality is NOT available in BVW-75 mode

RECORDING IN BVW-75 MODE: Recording in BVW-75 mode will allow you to record anywhere on the disk regardless of whether or not it has previously recorded material. You can begin recording by cueing to the point you wish to begin and pressing stop to end the recording. NOTE: Overwriting takes place when the recording stops; therefore, space must be available for the new material to be recorded. The space from the old video will become available after the new video is processed.

IMPORTANT NOTE:

If you record material in BVW-75 mode, the DVR uses the 24-hour time code as reference, which is still visible to the machine when you switch to native mode. However, when you record material in native mode and then switch to BVW-75 mode the machine does not recognize the native source list. You should always record in BVW-75 mode *if you intend to switch between personalities.*

Firmware Updating Procedure

New features for the mini dvr pro are posted to our website as they become available. Our customers have access to these features via firmware updates for the lifetime of the product. Please check this site regularly to implement the newest changes.

Firmware updates are located at www.ffv.com in the Support page.
Locate the latest revision of firmware for the video board (CVXX.fud). Download and unzip the files.

Hook up the mini dvr pro to your computer:
Hook a DB9 straight through cable to the 9 pin serial port of your computer.

Hyper Terminal Set-up:
On your host computer, open up the Hyper Terminal folder from the Start Menu, there should be an icon for setting up a new control called Hypertrm.

1. CONNECTION DESCRIPTION: FFV, choose an Icon, OK
2. PHONE NUMBER: Enter any phone number, choose a communication device, OK
3. CONNECT: Cancel
4. CONFIGURE /CONNECTION / CONNECTION PREFERENCES:
   BAUD RATE: **38,400** DATA BITS: **8** PARITY: **ODD** STOP BITS: **2**
   FLOW CONTROL: **NONE**
5. FILE / PROPERTIES / SETTINGS:
   FUNCTION: **terminal keys**, EMULATION: **ANSI**, BACKSCROLL BUFFER LINES: **500**

Specifications

VIDEO INPUT

Analog Input:	Composite and S-Video(Y/C).
Levels:	1.0Vp-p, 75 ohms
Standards:	525/60 (NTSC) or 625/50 (PAL)

VIDEO OUTPUT

Analog Output:	Composite and S-Video (Y/C).
Horizontal Resolution:	550 TV lines (at 5:1 compression)
Levels:	1.0Vp-p, 75 ohms
Standards:	525/60 (NTSC) or 625/50 (PAL)
Connections:	Multi-pin for component

VIDEO INPUT DECODER

Format:	Digital 4:2:2 YCrCb 60 fields per second NTSC 50 fields per second PAL
Digital Color Space:	YUV
Sampling:	13.5 MHz
Pixel Resolution:	720 x 486 pixels (525/60) 720 x 576 pixels (625/50)
S/N Ratio:	50 dB
Bandwidth:	7 MHz (-3 dB)
Differential Gain:	2%
Differential Phase:	2 deg.
ADC Differential Linearity:	+/- 0.7 LSB
ADC Integral Linearity:	+/- 1.0 LSB

VIDEO OUTPUT ENCODER

Digital Color Space:	Digital 4:2:2 YCrCb
Analog Bandwidth:	Y: 6.75 MHz C: 1.3 MHz
Composite:	4.5 MHz (NTSC) 5.0 MHz (PAL)
DAC Resolution:	10 bits x 3
S/N Ratio:	60 dB

VIDEO COMPRESSION

Codec:	Zoran
Method:	JPEG (Joint Photographic Experts Group)
Compression Ratio:	Variable down to 4:1

MEMORY

Multi-port Frame Buffer: 32 MB DRAM

COMPACT FLASH

Multiword (DMA) direct memory access, only. Sandisk or equivalent.

MICROPROCESSOR

Type:	Intel 80386EX
Clock Speed:	40 MHz
Local ROM/EPROM:	1MB Flash EEPROM
Local SRAM:	1MB 0 wait state

COMMUNICATIONS INTERFACE

RS-232:	Conforms to Sony “Remote (9 pin)” protocol. 38400 baud, 8 data bits, odd parity, 1 stop bit.

AUDIO SPECIFICATIONS

Resolution:	16 bits
Sampling Rate, FS:	8.0 KHz to 52 KHz
Channels:	2 in, 2 out
Dynamic Range:	80 dB
Total Harmonic Distortion:	022%, -73 dB
Intermodulation Distortion:	90 dB
Crosstalk:	-80 dB
Interchannel Gain Mismatch:	+/- 0.5dB
Input Voltage:	1 VRMS nominal, 3V p-p max
Input Impedance:	20K ohms
Input Programmable Gain Span:	22.5 dB
Full Scale Output Voltage:	0.707 VRMS, 2.0V p-p
Output Impedance:	600 ohms
Output Attenuation Range:	94.5 dB
Passband:	045 FS
Passband Ripple:	+/- 0.1 dB

GENERAL

Size:	5.2” W x 8” L x 3.7” D
Power Consumption:	3 watts not including storage device(s). Input Voltage – 4*AA battery or 9V DC Adapter
Warranty:	1 year

Specifications subject to change without notice

MAINTENANCE

Cleaning
The Housing should only require dusting with a soft cloth.

Operation and Storage Environment

Precautions
The Mini DVR Pro has been built to meet the demands of a professional environment, however, the hardware is subject to the same dangers from static as any other electronic device. Use care when connecting or disconnecting cables.

IMPORTANT: Take care not to introduce any moisture into the unit. Electronic assemblies are sensitive to static electricity, due to the electrostatic sensitive devices used within the circuitry. All semiconductors, as well as some resistors and capacitors, may be damaged or degraded by exposure to static electricity. The video card must receive adequate ventilation, and be kept as cool as possible. If you experience any problems with the unit please call Fast Forward Video's service department. **DO NOT ATTEMPT to repair or modify the unit as this might cause further damage, which could void your warranty**. A technician can determine whether your problem is caused by a faulty component, and whether you need to return it for evaluation and/or repair.

PACKAGE CONTENTS (May vary depending on model)
1 Mini DVR Pro
1 Multi Purpose Cable Assembly
1 9 VDC External Power Supply w/ 3-Pin Power Cable
1 Set (4) AA Batteries
1 USB Type A to Mini B 3' Cable Assembly
1 Control Software CD
1 Users Manual
1 Trouble Shooting Guide

PLEASE RETAIN THE ORIGINAL SHIPPING CARTON AND FOAM INSERTS If you need to return the unit for service or upgrade it is STRONGLY recommended that you use the original carton and foam, which were specifically designed to protect it from damage while in transit. IF RETURNED IN A REGULAR CARTON IT WILL BE REPLACED AT A FEE FOR THE RETURN SHIPMENT.

FCC Information to the user
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at his own expense. Notice to the end user: This device has been designed for use with interconnect cables with an installed length of three (3) feet or less. Use of cables of greater length may cause undesired behavior.

Limited Warranty

12 – MONTH LIMITED WARRANTY
Fast Forward Video, Inc. warrants to the original purchaser that the product (Hardware and components) shall be free from defects in material and workmanship for a period of 1 year from the date of purchase, If a defect covered by this warranty occurs during this 1 year period, Fast Forward Video, Inc. will repair or replace the defective product or component, at its option, free of charge.

WARRANTY LIMITATIONS
THIS WARRANTY SHALL NOT APPLY IF THIS PRODUCT: (a) IS DAMAGED BY NEGLIGENCE, ACCIDENT, MISUSE, OR BY OTHER CAUSES UNRELATED TO DEFECTIVE MATERIALS OR WORKMANSHIP; OR (b) HAS HAD THE SERIAL NUMBER ALTERED, DEFACED, OR REMOVED.

ANY APPLICABLE IMPLIED WARRANTIES ARE HEREBY LIMITED IN DURATION TO THE WARRANTY PERIOD DESCRIBED ABOVE. IN NO EVENT SHALL FAST FORWARD VIDEO, INC. BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM THE BREACH OF ANY IMPLIED OR EXPRESS WARRANTIES. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR EXCLUSION OF CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.

REVISION HISTORY
Rev 1.3 – Added “Clear disk” keystroke per July 11, 2005 firmware change.
Added information about long filename and audio in USB section.

Rev. 1.4 – Added full pin-out information; removed single USB access limitation; made other minor changes.